

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

1-26 (cancelled)

27. (currently amended) A functionalized carbon nanotube, comprising:

~~the surface of which carries~~

a surface having homogeneously-distributed covalently bound reactive and/or activable functional groups ~~which are homogeneously distributed on said surface, wherein~~

said functionalized carbon nanotube ~~being~~ is substantially intact and soluble in organic and/or aqueous solvents.

28. (currently amended) [[A]] The functionalized carbon nanotube according to claim 27, wherein said carbon nanotube is a single-walled (SWNT) or a multi-walled carbon nanotube (MWNT).

29. (currently amended) [[A]] The functionalized carbon nanotube according to claim 28, wherein the organic solvents are selected from [[a]] the group comprising-consisting of dimethylformamide, dichloromethane, chloroform, acetonitrile, dimethylsulfoxide, methanol, ethanol, toluene, isopropanol, 1,2-dichloroethane, N-methylpyrrolidone, and tetrahydrofuran.

30. (currently amended) [[A]] The functionalized carbon nanotube according to claim 29, of following general formula: $[C_n]-X_m$

wherein:

C_n are surface carbons of a substantially cylindrical carbon nanotube of substantially constant diameter, said diameter being from about 0.5 to about 50 nm, in particular from about 0.5 to 5 nm for SWNTs and from about 20 to about 50 nm for MWNTs,

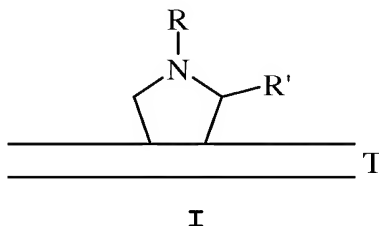
X is a functional group,

n is an integer from about ~~$3 \cdot 10^3$~~ 3×10^3 to about ~~$3 \cdot 10^6$~~ 3×10^6 ,

m is an integer from about 0.001n to about 0.1n,

there are from about ~~$2 \cdot 10^{-11}$~~ 2×10^{-11} moles to about ~~$2 \cdot 10^{-9}$~~ 2×10^{-9} moles of X functional groups per cm^2 of carbon nanotube surface.

31. (currently amended) [[A]] The functionalized carbon nanotube according to claim 30, wherein X is a pyrrolidine ring, of the following general formula (I):



wherein:

T represents a carbon nanotube, and ~~independently from each other~~

R and R', independently from each other, represent -H or a group of

formula $-M-Y-(Z)_a-(P)_b$,

wherein ~~independently from each other~~

a and b, independently from each other, represent 0 or 1, provided R and R' cannot simultaneously represent H, ~~and:~~

M is a spacer group from about 1 to about 100 atoms,

Y is a reactive group when a=b=0, or derived from a reactive group,

Z is a linker group, liable to be linked to a P group, and, optionally, to release said P group, and

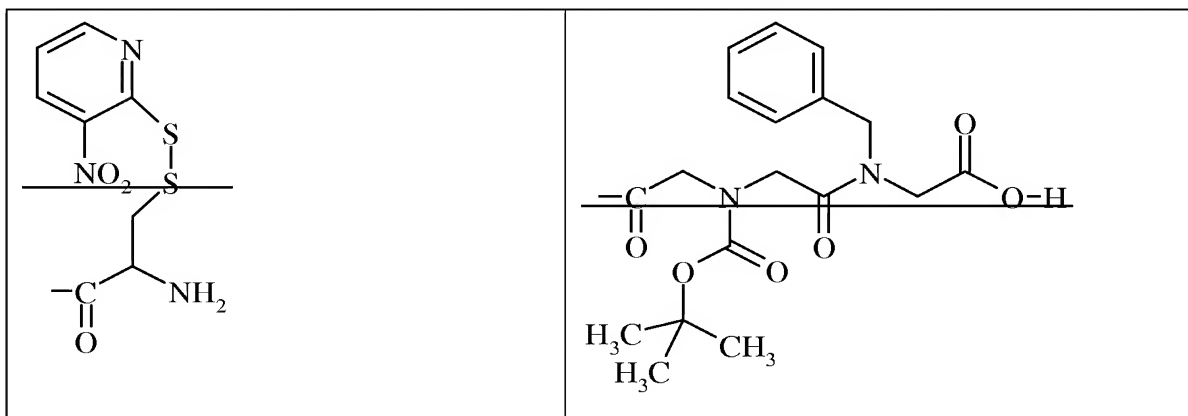
P is an effective group allowing spectroscopic detection of said functionalized carbon nanotube, or an active molecule, liable to induce a biological effect.

~~• M is a spacer group from about 1 to about 100 atoms, such as a group selected from the list comprising $(CH_2)_r$ or $(CH_2-CH_2-O)_r-CH_2-CH_2$, wherein r is an integer from 1 to 20;~~

~~• Y is a reactive group when a=b=0, such as a group selected from the list comprising OH, NH_2 , COOH, SH, CHO, a ketone such as $COCH_3$, an azide or a halide;~~

~~or derived from a reactive group, when a or b is different from 0, such as a group selected from the list comprising O, NH, COO, S, $CH=$, CH_2 , $CC_kH_{2k+1}=$, wherein k is an integer from 1 to 10, in particular $CCH_3=$, or CHC_kH_{2k+1} , wherein k is an integer from 1 to 10, in particular $CHCH_3$;~~

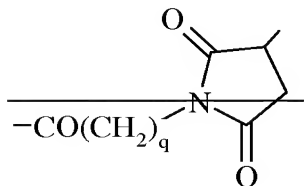
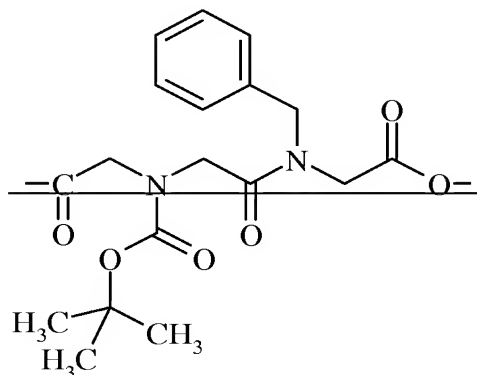
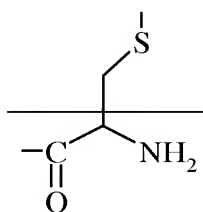
~~• Z is a linker group, liable to be linked to a P group, and if need be to release said P group, such as a group of one of the following formulae when a=1 and b=0:~~





wherein q is an integer from 1 to 10;

or of one of the corresponding following formulae when a=1 and b=1:



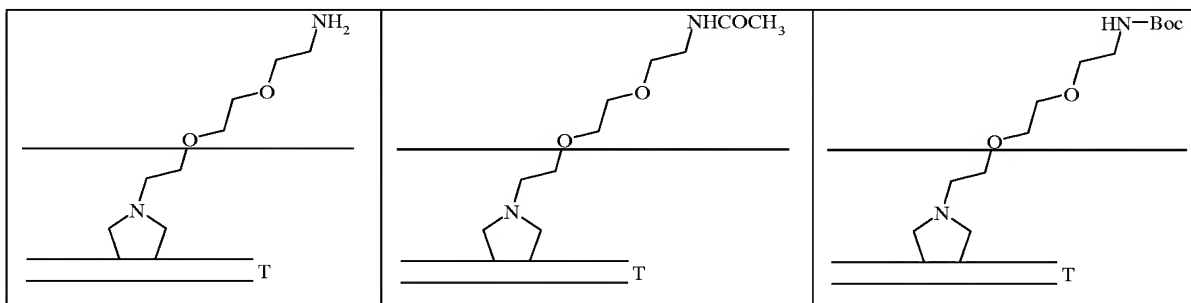
wherein q is an integer from 1 to 10;

• P is an effective group allowing spectroscopic detection of said functionalized carbon nanotube, such as a fluorophore, such as FITC, or an active molecule, liable to induce a biological effect, such as an amino acid, a peptide, a pseudopeptide, a protein, such as an enzyme or an antibody, a nucleic acid, a carbohydrate, or a drug.

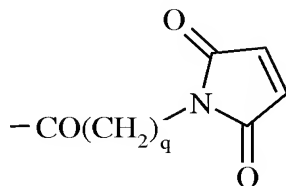
if appropriate at least one of Y, Z, or P groups, can be substituted by a capping group, such as CH₃CO- (acetyl), methyl, or ethyl, or a protecting group such as methyl, ethyl, benzyl, tert butyl, trityl, 3-nitro-2-pyridylsulfenyl, tert-

~~butyloxycarbonyl (Boc), fluorenylmethyloxycarbonyl (Fmoc), benzylcarbonyl, trimethylsilylethylloxycarbonyl, phthalimide, dimethylacetal, diethylacetal or, 1,3 dioxolane.~~

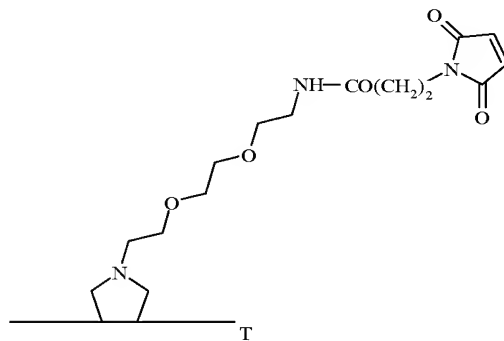
32. (currently amended) [[A]] The functionalized carbon nanotube according to claim 31, wherein a=b=0 and Y is a reactive group selected from the ~~list comprising~~ group consisting of -OH, -NH₂, -COOH, -SH, -CHO, a ketone, ~~such as COCH₃,~~ an azide, [[or]] and a halide, ~~in particular NH₂,~~ said functionalized carbon nanotube being, if appropriate, substituted by a capping or a protecting group, in particular a Boc or acetyl group, and being for instance a functionalized carbon nanotube of one of the following formulae:



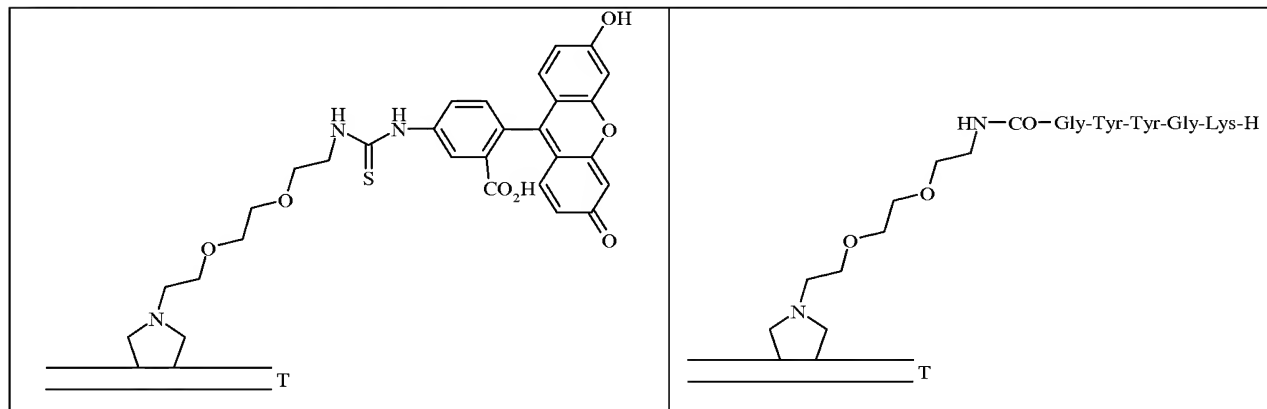
33. (withdrawn) A functionalized carbon nanotube according to claim 31, wherein a=1 and b=0, Y is derived from a reactive group and selected from the list comprising -O-, -NH-, -COO-, -S-, -CH=, -CH₂-, -CC_kH_{2k+1}=, wherein k is an integer from 1 to 10, in particular -CCH₃=, or -CHC_kH_{2k+1}-, wherein k is an integer from 1 to 10, in particular -CHCH₃-, and Z represents in particular the group of the following formula:

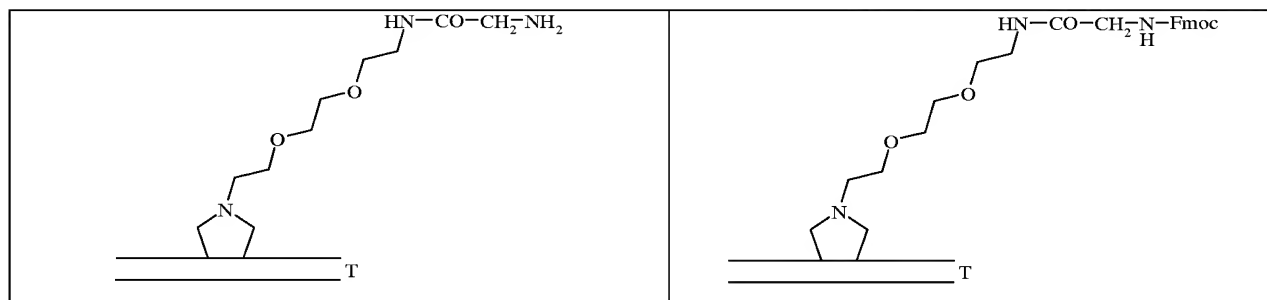


wherein q is an integer from 1 to 10, said functionalized carbon nanotube being if appropriate substituted by a protecting group being for instance the functionalized carbon nanotube of the following formula:

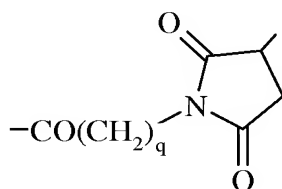


34. (withdrawn) A functionalized carbon nanotube according to claim 31, wherein $a=0$ and $b=1$, Y is derived from a reactive group and selected from the list comprising $-O-$, $-NH-$, $-COO-$, $-S-$, $-CH=$, $-CH_2-$, $-CC_kH_{2k+1}=$, wherein k is an integer from 1 to 10, in particular $-CCH_3=$, or $-CHC_kH_{2k+1}-$, wherein k is an integer from 1 to 10, in particular $-CHCH_3-$, and P is an effective group or an active molecule, in particular FITC, an amino acid, such as glycine, or a peptide, such as the peptide H-Lys-Gly-Tyr-Tyr-Gly-OH, said functionalized carbon nanotube being if appropriate substituted by a protecting group, such as Fmoc, and being for instance a functionalized carbon nanotube of one of the following formulae:

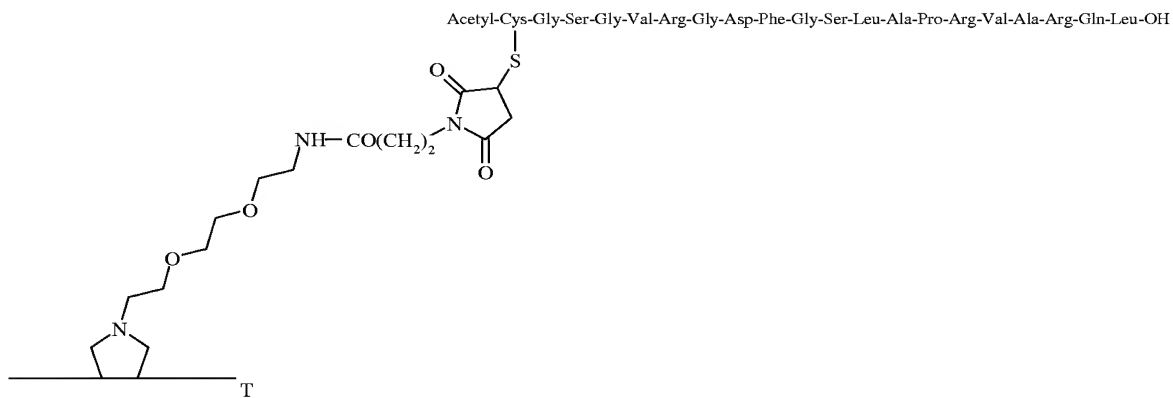




35. (withdrawn) A functionalized carbon nanotube according to claim 31, wherein $a=1$ and $b=1$, Y is derived from a reactive group and selected from the list comprising $-O-$, $-NH-$, $-COO-$, $-S-$, $-CH=$, $-CH_2-$, $-CC_kH_{2k+1}=$, wherein k is an integer from 1 to 10, in particular $-CCH_3=$, or $-CHC_kH_{2k+1}-$, wherein k is an integer from 1 to 10, in particular $-CHCH_3-$, Z represents in particular the group of the following formula:

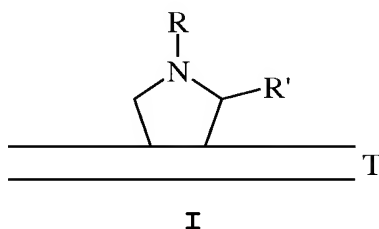


wherein q is an integer from 1 to 10, and P is a peptide, such as the peptide Acetyl-Cys-Gly-Ser-Gly-Val-Arg-Gly-Asp-Phe-Gly-Ser-Leu-Ala-Pro-Arg-Val-Ala-Arg-Gln-Leu-OH, said functionalized carbon nanotube being if appropriate substituted by a protecting group, being for instance the functionalized carbon nanotube of the following formula:



36. (withdrawn) A functionalized carbon nanotube according to claim 34, wherein P is a peptide or a protein, said peptide or protein comprising in particular a B cell epitope or a T cell epitope, such as a T helper epitope or a T cytotoxic epitope, or a mixture thereof.

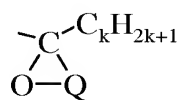
37. (withdrawn) A process for preparing a functionalized carbon nanotube of the following formula I:

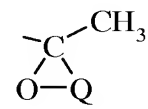


wherein T represents a carbon nanotube and independently from each other R and R' represent -H or a group of formula -M-Y, provided R and R' cannot simultaneously represent H, wherein:

- -M- is a spacer group from about 1 to about 100 atoms, such as a group selected from the list comprising $-(CH_2)_r-$ or $-(CH_2-CH_2-O)_r-CH_2-CH_2-$, wherein r is an integer from 1 to 20;

- -Y is a reactive group, such as a group selected from the list comprising, -OH, -NH₂, -COOH, -SH, -CHO, a ketone such as -COCH₃, an azide, a halide, if appropriate protected,

such as -O-Q, -NH-Q, -COO-Q, -S-Q, -CH(OQ)₂,  wherein k

is an integer from 1 to 10, in particular , wherein Q is a protecting group or forms a protecting group with the adjacent atoms to which it is linked;

said process comprising the following step:

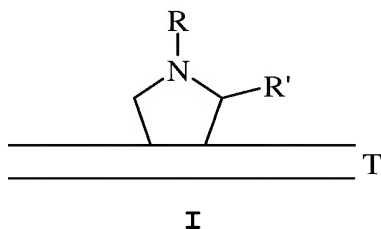
- adding, to a carbon nanotube, the compounds R'-CHO and R-NH-CHR'''-COOR''' by a 1,3-dipolar cycloaddition, wherein:

- R and R' are as defined above;
- R'' is -H or an amino acid side-chain;
- R''' is -H, an alkyl group of 1 to 5 carbon atoms, a $(\text{CH}_2\text{CH}_2\text{O})_t\text{-CH}_3$ group, wherein t is an integer from 1 to 20, or an aromatic group;

to obtain a functionalized carbon nanotube of formula I, if appropriate protected;

- if necessary, deprotecting the functionalized carbon nanotube of formula I, to obtain an unprotected functionalized carbon nanotube of formula I.

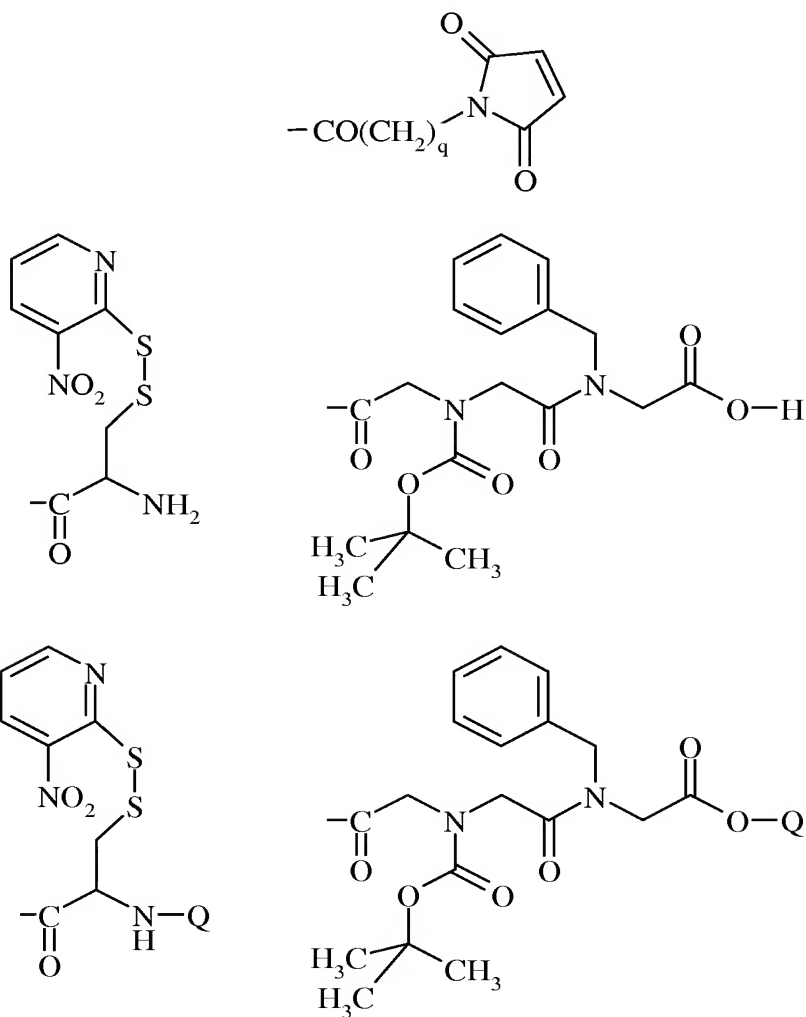
38. (withdrawn) A process for preparing a functionalized carbon nanotube of the following formula I:



wherein T represents a carbon nanotube and independently from each other R and R' represent -H or a group of formula -M-Y-Z, provided R and R' cannot simultaneously represent -H, wherein:

- -M- is a spacer group from about 1 to about 100 atoms, such as a group selected from the list comprising $-(\text{CH}_2)_r\text{-}$ or $-(\text{CH}_2\text{-CH}_2\text{-O})_r\text{-CH}_2\text{-CH}_2\text{-}$, wherein r is an integer from 1 to 20;
- -Y- is a group derived from a reactive group, such as a group selected from the list comprising, -O-, -NH-, -COO-, -S-, -CH=, -CH₂-, -CC_kH_{2k+1}=, wherein k is an integer from 1 to 10, in particular -CCH₃=, or -CHC_kH_{2k+1}-, wherein k is an integer from 1 to 10, in particular -CHCH₃-;
- -Z is a linker group, liable to be linked to a P group, and if need be to release said P group, if appropriate

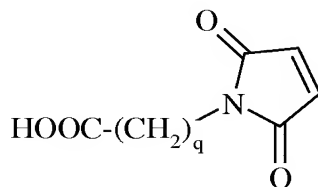
protected by a capping or a protecting group -Q, such as a group of one of the following formulae:

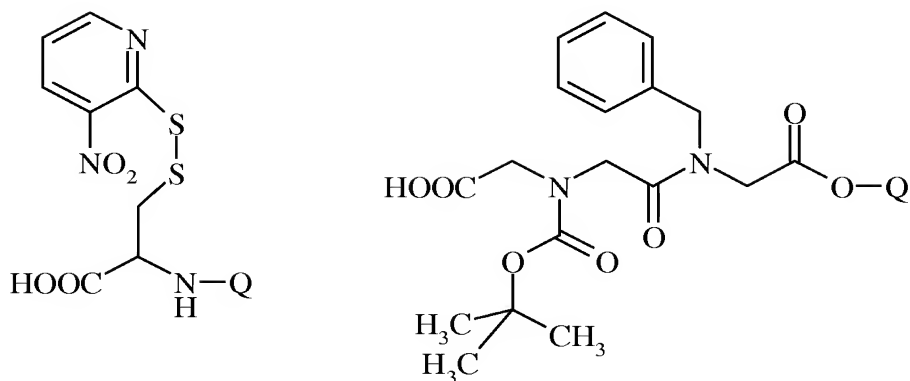


wherein q is an integer from 1 to 10;

said process comprising the following steps:

- adding to a unprotected functionalized carbon nanotube of formula I according to claim 37 a linker group of formula Z, if appropriate protected by a capping or a protecting group -Q, such as a group of one of the following formulae:



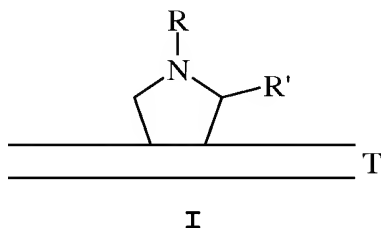


wherein q is an integer from 1 to 10;

to obtain a functionalized carbon nanotube of formula I, if appropriate protected;

- if necessary, deprotecting the functionalized carbon nanotube of formula I, to obtain an unprotected functionalized carbon nanotube of formula I.

39. (withdrawn) A process for preparing a functionalized nanotube of the following formula I:

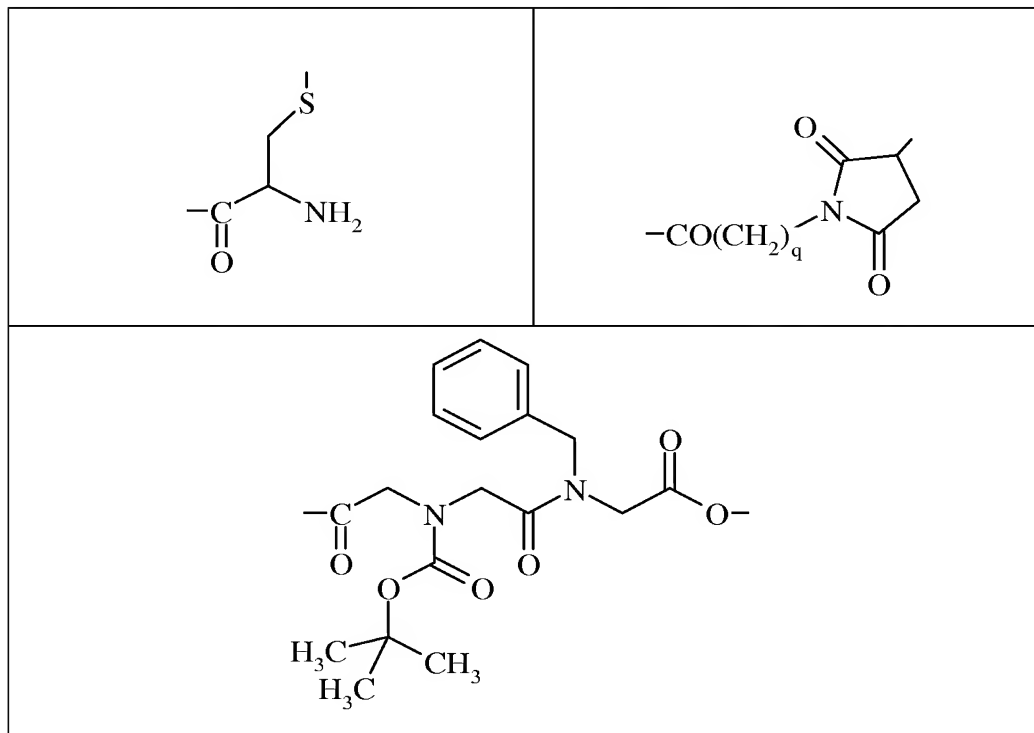


wherein T represents a carbon nanotube and independently from each other R and R' represent $-H$ or a group of formula $-M-Y-Z-P$ or of formula $-M-Y-P$, provided R and R' cannot simultaneously represent $-H$, wherein:

- $-M-$ is a spacer group from about 1 to about 100 atoms, such as a group selected from the list comprising $-(CH_2)_r-$ or $-(CH_2-CH_2-O)_r-CH_2-CH_2-$, wherein r is an integer from 1 to 20;
- $-Y-$ is a group derived from a reactive group, such as a group selected from the list comprising, $-O-$, $-NH-$, $-COO-$, $-S-$, $-CH=$, $-CH_2-$, $-CC_kH_{2k+1}=$, wherein k is an integer from 1 to 10,

in particular $-CCH_3=$, or $-CHC_kH_{2k+1}-$, wherein k is an integer from 1 to 10, in particular $-CHCH_3-$;

▪ $-Z-$ is a linker group, liable to be linked to a P group, and if need be to release said P group, such as a group of one of the following formulae:



wherein q is an integer from 1 to 10;

▪ $-P$ is an effective group allowing spectroscopic detection of said functionalized carbon nanotube, such as a fluorophore, such as FITC, or an active molecule, liable to induce a biological effect, if appropriate protected, such as an amino acid, a peptide, a pseudopeptide, a protein, such as an enzyme or an antibody, a nucleic acid, a carbohydrate, or a drug; said process comprising the following steps:

- adding to an unprotected functionalized carbon nanotube of formula I according to claim 37, an effective group or an active molecule of formula P, if appropriate protected, such as a fluorophore, such as FITC, an amino acid, a peptide, a

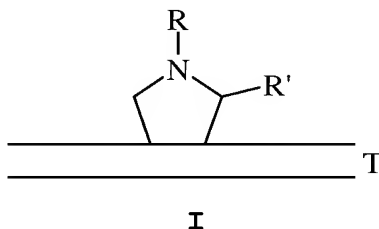
pseudopeptide, a protein, such as an enzyme or an antibody, a nucleic acid, a carbohydrate, or a drug,

or adding to an unprotected functionalized carbon nanotube of formula I, a group of formula Z-P, if appropriate protected,

to obtain a functionalized carbon nanotube of formula I, if appropriate protected;

- if necessary, deprotecting the functionalized carbon nanotube of formula I, to obtain an unprotected functionalized carbon nanotube of formula I.

40. (withdrawn) A process for preparing a peptide or protein functionalized carbon nanotube, of the following formula I:

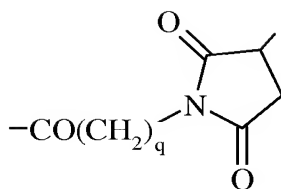


wherein T represents a carbon nanotube and independently from each other R and R' represent H or a group of formula -M-Y-P, or of formula -M-Y-Z, provided R and R' cannot simultaneously represent -H, wherein:

- -M- is a spacer group from about 1 to about 100 atoms, such as a group selected from the list comprising $-(CH_2)_r-$ or $-(CH_2-CH_2-O)_r-CH_2-CH_2-$, wherein r is an integer from 1 to 20;

- -Y- is a group derived from a reactive group, such as a group selected from the list comprising, -O-, -NH-, -COO-, -S-, -CH=, -CH₂-, -CC_kH_{2k+1}=, wherein n is an integer from 1 to 10, in particular -CCH₃=, or -CHC_kH_{2k+1}-, wherein k is an integer from 1 to 10, in particular -CHCH₃-;

- -Z- is a linker group, in particular a group of the following formula:



wherein q is an integer from 1 to 10;

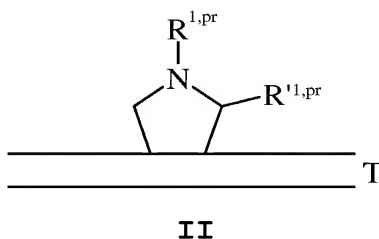
▪ $-P$ is a peptide, in particular of following formula: $-[OC-CH(A_i)-NH]_t-H$, wherein $-A_i$ is an amino acid side-chain, i is an integer from 1 to t and t is an integer from 1 to 150, advantageously from 1 to 50;

said process comprising the following steps:

• adding to a functionalized carbon nanotube of formula I, according to claim 37, a protected amino acid of the following formula:

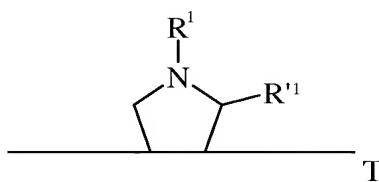


wherein $-A_i$ is as defined above and $-Q$ is a protecting group to obtain a functionalized carbon nanotube of the following formula II:



wherein independently from each other $R^{1,pr}$ and $R'^{1,pr}$ represent $-H$ or a group of formula $-M-Y-OC-CH(A_i)-NH-Q$, or of formula $-M-Y-Z-OC-CH(A_i)-NH-Q$, wherein $-M-$, $-Y-$, $-Z-$, $-A_i$ and $-Q$ are as defined above;

• deprotecting the functionalized carbon nanotube of formula II to obtain a functionalized carbon nanotube of the following formula III:



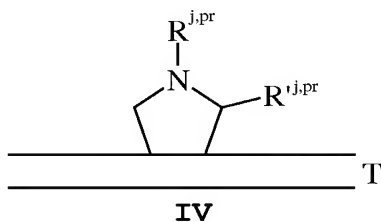
III

wherein independently from each other R^1 and R'^1 represent -H or a group of formula $-M-Y-OC-CHA_i-NH_2$, or of formula $-M-Y-Z-OC-CHA_i-NH_2$, wherein -M-, -Y-, -Z-, and $-A_i$ are as defined above;

- adding to the functionalized carbon nanotube obtained at the preceding step a protected amino acid of the following formula:

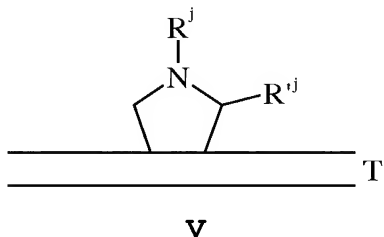


wherein $-A_i$ is as defined above and -Q is a protecting group to obtain a functionalized carbon nanotube of the following formula IV:



wherein independently from each other $R^{j,pr}$ and $R'^{j,pr}$ represent -H or a group of formula $-M-Y-[OC-CHA_i-NH]_j-Q$, or of formula $-M-Y-Z-[OC-CHA_i-NH]_j-Q$, wherein -M-, -Y-, -Z-, $-A_i$ and -Q are as defined above, and j is an integer from 2 to t;

- deprotecting the functionalized carbon nanotube of formula IV to obtain a functionalized carbon nanotube of the following formula V:

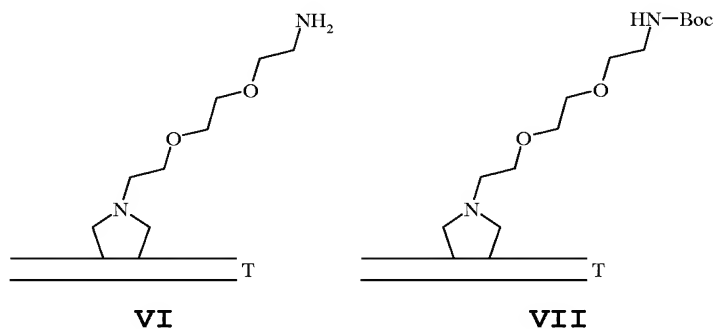


wherein independently from each other R^j and R'^j represent -H or a group of formula $-M-Y-[OC-CHA_i-NH]_j-H$, or of formula $M-Y-Z-[OC-CHA_i-NH]_j-H$, wherein -M-, -Y-, -Z-, and $-A_i$ are as defined above, and j is an integer from 2 to t;

- repeating the last two steps t-1 times to obtain a peptide or protein functionalized carbon nanotube of formula I.

41. (withdrawn) A process according to claim 38, wherein -Q is a capping group, such as $\text{CH}_3\text{CO}-$ (acetyl), methyl, or ethyl, or a protecting group, such as a group selected from the list comprising methyl, ethyl, benzyl, *tert*-butyl, trityl, 3-nitro-2-pyridylsulfenyl, *tert*-butyloxycarbonyl (Boc), fluorenylmethyloxycarbonyl (Fmoc), benzylcarbonyl, trimethylsilylethyloxycarbonyl, phthalimide, or ethyleneoxy.

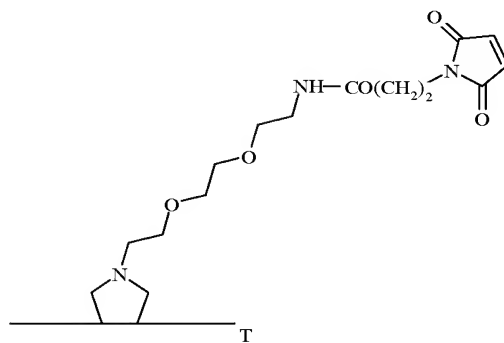
42. (withdrawn) A process for preparing a functionalized carbon nanotube of one of the following formulae VI and VII:



wherein T represents a carbon nanotube and Boc represents *tert*-butyloxycarbonyl, said process comprising the following steps:

- adding, to a carbon nanotube, the compounds $(\text{CH}_2\text{O})_n$ (*para*formaldehyde) and $\text{Boc-NH}-(\text{CH}_2-\text{CH}_2-\text{O})_2-\text{CH}_2-\text{CH}_2-\text{NH}-\text{CH}_2-\text{COOH}$ by a 1,3-dipolar cycloaddition, to obtain a protected functionalized carbon nanotube of formula VII;
- if necessary, deprotecting the protected functionalized carbon nanotube of formula VII, to obtain an unprotected functionalized carbon nanotube of formula VI.

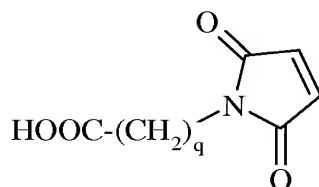
43. (withdrawn) A process for preparing a functionalized carbon nanotube of the following formula VIII:



VIII

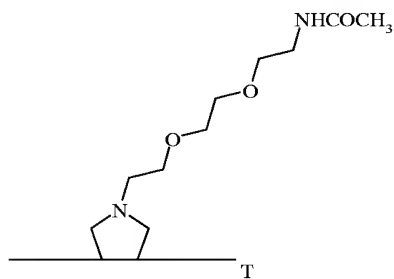
wherein T represents a carbon nanotube, said process comprising the following step:

- adding, to a carbon nanotube of formula VI according to claim 42, a compound of the following formula:

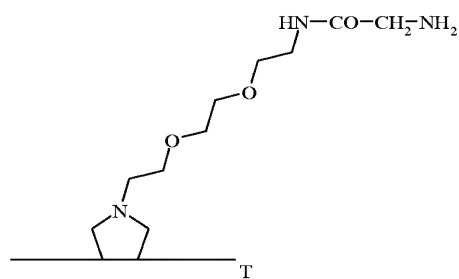


to obtain a functionalized carbon nanotube of formula VIII.

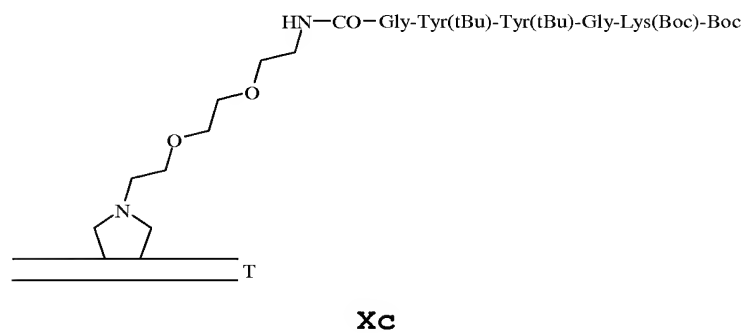
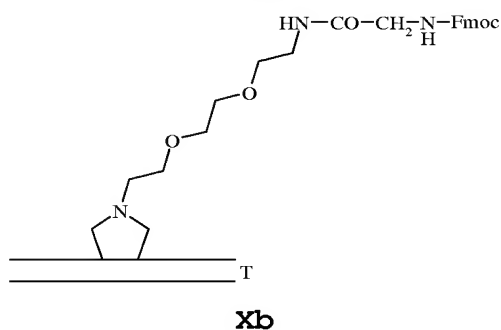
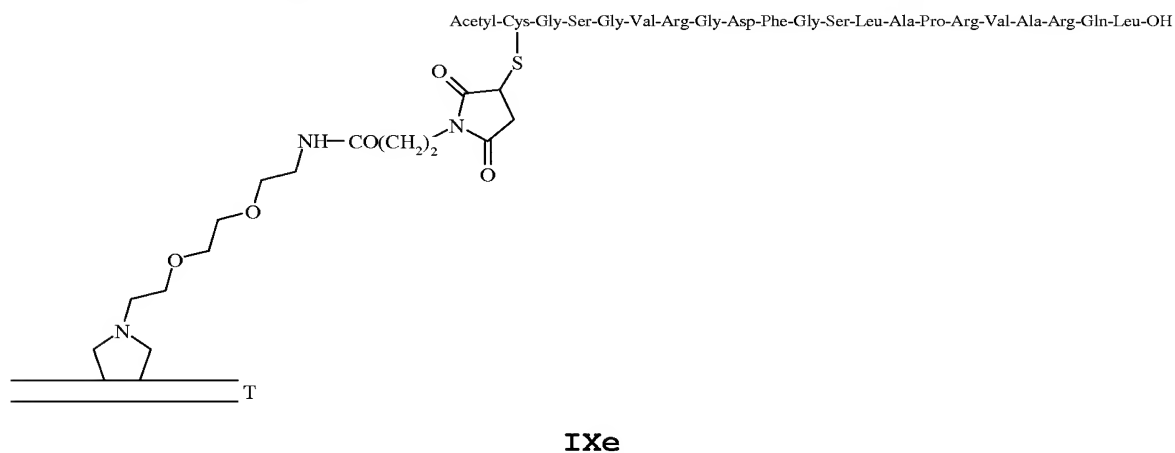
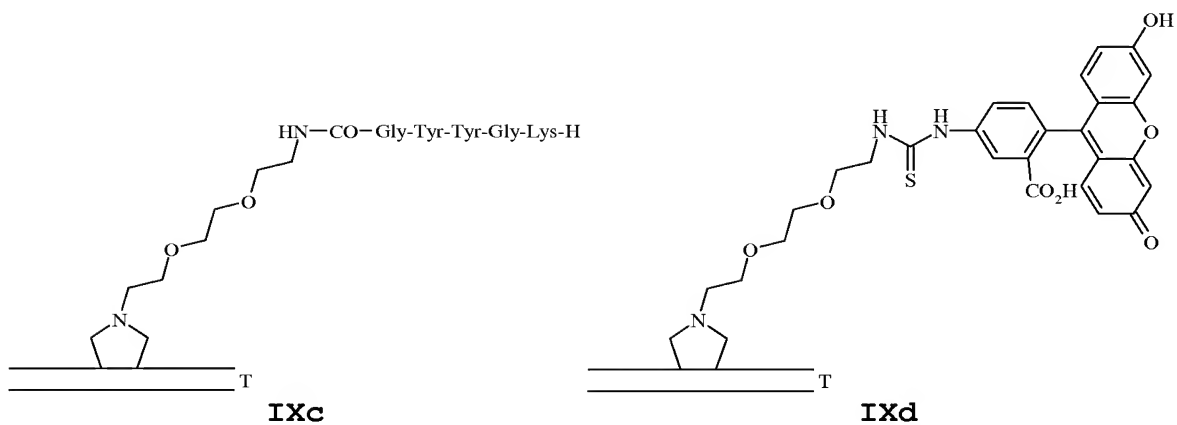
44. (withdrawn) A process for preparing a functionalized carbon nanotube of one of the following formulae IXa, IXb, IXc, IXd, IXe, Xb and Xc:



IXa



IXb

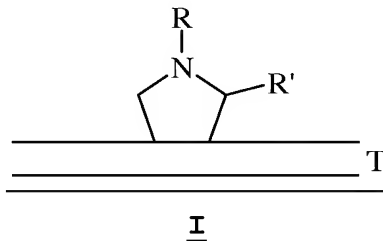


wherein T represents a carbon nanotube, Fmoc represents fluorenylmethyloxycarbonyl, tBu represents tert-butyl and Boc

represents tert-butyloxycarbonyl, said process comprising the following steps:

- adding,
 - either to a functionalized carbon nanotube of formula VI according to claim 42, a group chosen among: $\text{CH}_3\text{-COOH}$, Fmoc-Gly-OH, Boc-Lys(Boc)-Gly-Tyr(tBu)-Tyr(tBu)-Gly-OH, or FITC,
 - or to a functionalized carbon nanotube of formula VIII, the following group, Acetyl-Cys-Gly-Ser-Gly-Val-Arg-Gly-Asp-Phe-Gly-Ser-Leu-Ala-Pro-Arg-Val-Ala-Arg-Gln-Leu-OH,to obtain a functionalized carbon nanotube of respective formula IXa, Xb, Xc, IXd or IXe;
- if necessary, deprotecting the functionalized carbon nanotube of formula Xb or Xc to obtain respectively the functionalized carbon nanotube of formula IXb or IXc.

45. (currently amended) A functionalized carbon nanotube ~~such as obtained by the process of claim 37~~ of the following formula I:



wherein:

T represents a carbon nanotube, and

R and R', independently from each other, represent -H
or a group of

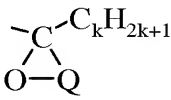
formula -M-Y,

provided R and R' cannot simultaneously represent H,

wherein:

-M- is a spacer group from about 1 to about 100 atoms,
and selected from the group consisting of -(CH₂)_r- and -(CH₂-CH₂-
O)_t-CH₂-CH₂-, wherein r is an integer from 1 to 20,

-Y is a reactive group selected from the group
consisting of -OH, -NH₂, -COOH, -SH, -CHO, a ketone such as -
COCH₃, an azide, and a halide, and optionally protected by a
structure selected from the group consisting of -O-Q, -NH-Q, -

COO-Q, -S-Q, -CH(OQ)₂,  wherein k is an integer from 1
to 10, wherein Q is a protecting group or forms a protecting
group with the adjacent atoms to which it is linked,

said functionalized carbon nanotube obtained by the
process comprising the following step:

adding, to a carbon nanotube, the compounds R'-CHO and
R-NH-CHR'' -COOR''' by a 1,3-dipolar cycloaddition, wherein:

R and R' are as defined above,

R'' is -H or an amino acid side-chain,

R''' is -H, an alkyl group of 1 to 5 carbon atoms, a
(CH₂CH₂O)_t-CH₃ group, wherein t is an integer from 1 to 20, or an
aromatic group;

to obtain a functionalized carbon nanotube of formula
I, optionally protected, and

optionally, deprotecting the functionalized carbon
nanotube of formula I, to obtain an unprotected functionalized
carbon nanotube of formula I.

46. (withdrawn) A pharmaceutical composition comprising as active substance at least one functionalized carbon nanotube according to claim 27, in association with a pharmaceutically acceptable vehicle, such as a liposome, a cyclodextrin, a microparticle, a nanoparticle, or a cell penetrating peptide.

47. (withdrawn) A method of transport of pharmaceutically active molecules comprising the use of a functionalized carbon nanotube according to claim 27.

48. (withdrawn) A method of delivery of drugs, in particular of intracellular delivery of drugs, comprising the use of an appropriate amount of a functionalized carbon nanotube according to claim 27.

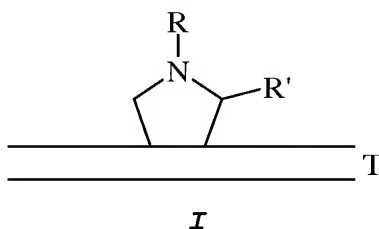
49. (withdrawn) A method of preparation of an immunogenic composition intended to provide an immunological protection to the individual to whom it has been administered, comprising the use of an appropriate amount of a functionalized carbon nanotube according to claim 27.

50. (withdrawn) A method for the treatment or the prophylaxis of cancer, autoimmune or infectious diseases, comprising the administration of an appropriate amount of a functionalized carbon nanotube according to claim 27.

51. (withdrawn) A method of preparation of functionalized surfaces such as plastic or glass surfaces comprising the use of a functionalized carbon nanotube according to claim 27.

52. (withdrawn) A method of preparation of electrochemical biosensors comprising the use of a functionalized carbon nanotube according to claim 27.

53. (new) The functionalized carbon nanotube according to claim 31, wherein X is a pyrrolidine ring, of the following general formula (I):



wherein:

T represents a carbon nanotube, and

R and R', independently from each other represent, -H or a group of

formula $-M-Y-(Z)_a-(P)_b$,

wherein:

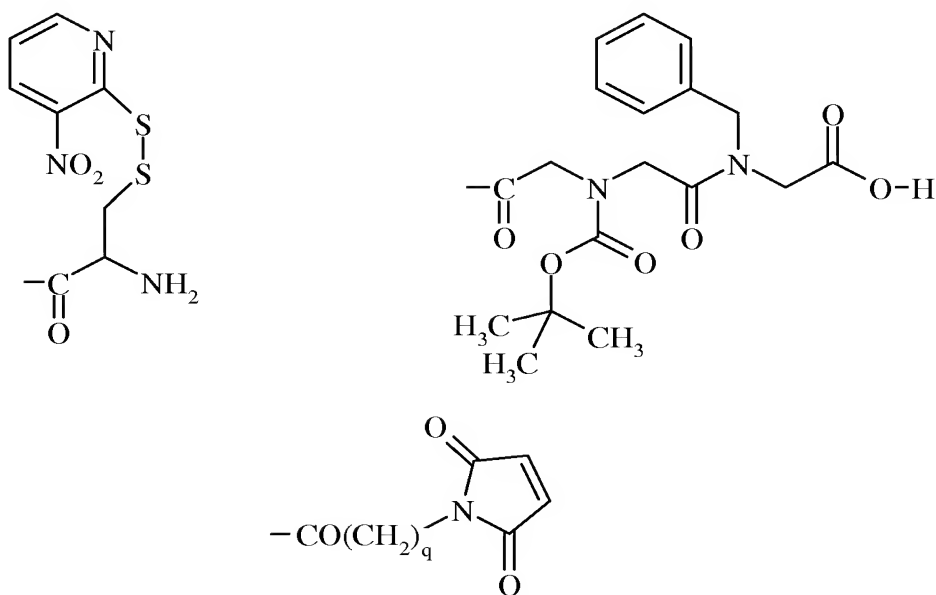
a and b, independently from each other, represent 0 or 1, provided R and R' cannot simultaneously represent H,

M is a spacer group, selected from the group consisting of $-(CH_2)_r-$ and $-(CH_2-CH_2-O)_r-CH_2-CH_2-$, wherein r is an integer from 1 to 20,

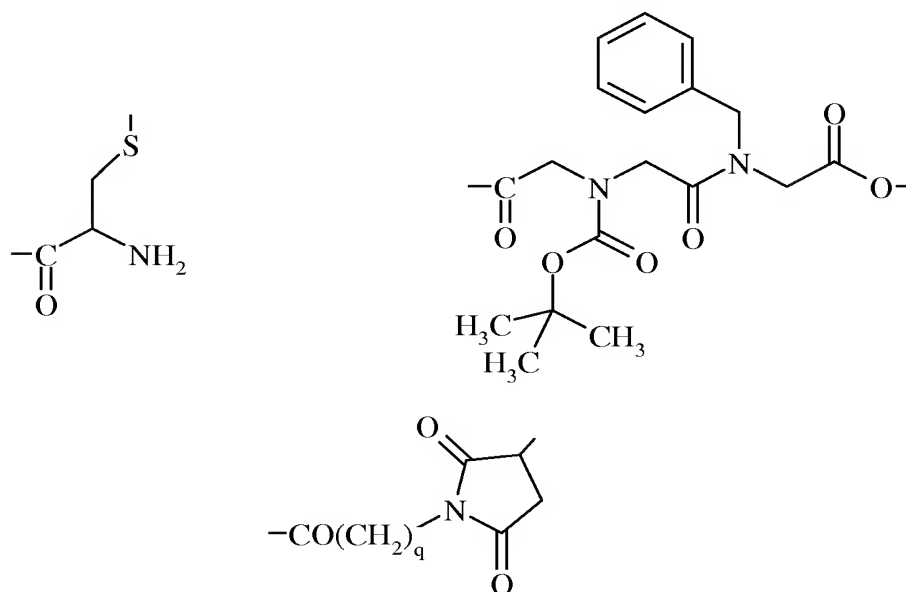
Y is a reactive group when $a=b=0$, selected from the group consisting of -OH, -NH₂, -COOH, -SH, -CHO, a ketone, an azide and a halide, or derived from a reactive group, when a or b is different from 0, selected from the group consisting of -O-, -NH-, -COO-, -S-, -CH=, -CH₂-, and $-CC_kH_{2k+1}=$, wherein k is an integer from 1 to 10,

Z is a linker group, liable to be linked to at least one P group, and, optionally, to release said P group, selected

from the group consisting of the following formulae when a=1 and b=0:



wherein q is an integer from 1 to 10,
 or of one of the corresponding following formulae when a=1 and b=1:



wherein q is an integer from 1 to 10, and

P is an effective group allowing spectroscopic detection of said functionalized carbon nanotube, selected from the group consisting of a fluorophore, FITC, and an active molecule, liable to induce a biological effect, selected from the group consisting of an amino acid, a peptide, a pseudopeptide, a protein, a nucleic acid, a carbohydrate, and a drug.

54. (new) The functionalized carbon nanotube according to 31, wherein

a=b=0, and being a functionalized carbon nanotube of one of the following formulae:

